RESEARCH HIGHLIGHT

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Brownfield Redevelopment for Housing: Case Studies

INTRODUCTION

Canada has an estimated 30,000 brownfields, according to the National Round Table on the Environment and the Economy (NRTEE). Many of these sites are located in established urban areas and for the most part, municipal services are readily available. Many could be cleaned up to meet today's environmental standards and transformed into productive use, including housing.

Brownfield redevelopment can be an important part of creating sustainable communities. The redevelopment of brownfields for residential purposes offers opportunities to revitalize older neighbourhoods, lower municipal infrastructure costs, manage growth, and contribute towards the preservation of agricultural land, improved air quality and the reduction of greenhouse gas emissions.

PURPOSE

Brownfield redevelopment for housing in Canada faces a number of challenges as identified in a companion literature review, *Brownfield Redevelopment for Housing : Literature Review and Analysis* (Research Highlight 63948). Despite the obstacles, successful brownfield redevelopment projects have been built across the country and initiatives have been implemented to encourage and support brownfield redevelopment. This study profiled 11 examples of brownfield built projects and initiatives, to share the good ideas and the lessons that can be learned from them. The case studies illustrate how successful residential developments overcame some of the barriers facing brownfield sites. It is hoped that the case studies will be of use to municipal officials, developers and others who are considering undertaking similar projects and initiatives.

The eleven brownfield case studies include nine built projects. These are summarized in Table 1. Two initiatives designed to support and encourage brownfield redevelopment were also profiled and are summarized in Table 2[1].

METHODOLOGY

The case studies were selected to provide regional representation from across the country while profiling a range of projects in terms of size, number of residential units, regulatory complexity and level of environmental contamination. In each case, interviews were conducted with those most familiar with the project or initiative, including developers, municipal and provincial officials, and environmental and planning consultants. These individuals provided their perspectives on the factors that contributed to project/initiative success, the lessons learned, and insights into how the challenges were overcome.

FINDINGS

The case studies suggest that the issues and barriers associated with redeveloping brownfield sites for residential use can be grouped into the following general categories

a) environmental remediation costs

b) financial and general economic conditions

c) planning and regulatory approvals

d) neighbourhood opposition (Not In My Back Yard – NIMBY)

Environmental Remediation Costs

Residential intensification projects, including brownfield redevelopments, often experience higher development costs that can limit their economic feasibility. Brownfield redevelopments face the added cost associated with addressing the environmental contamination. Environmental contamination increases the complexity and cost of a development project because it may require that:

a) qualified professionals be hired to conduct an Environmental Site Assessment (ESA) to determine the nature and extent of contamination on the property;

[1] Additional brownfield redevelopment case studies are profiled in CMHC's *Residential Intensification Case Studies: Built Projects* (Research Highlight 63440) and *Residential Intensification Case Studies: Municipal Initiatives* (Research Highlight 63337).

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b) a Remedial Action Plan (RAP) be prepared to address the contamination identified in the ESA;

c) soils be treated and/or excavated and disposed of off-site and/or groundwater be treated;

d) more extensive (relative to that for a greenfield site) public consultation and community outreach be conducted to allay concerns around environmental contamination and promote acceptance of the intended use.

Together, these factors can create longer wait times for environmental regulatory and planning approvals and additional uncertainty in terms of obtaining financing. The case studies revealed that the additional costs associated with environmental contamination can be overcome in a number of ways including the use of:

a) alternative assessment and remediation approaches (such as, risk assessment based approaches);

b) alternative remediation technologies (such as, bioremediation, soils recycling).

A traditional remediation approach involves excavation and off-site disposal of soils that exceed generic criteria. This approach, commonly referred to as "dig and dump," can be very costly for large volumes of soil and/or soils that are classed as "hazardous." Hazardous soils must be disposed of at specialized facilities and the cost can be several times the cost of disposing of non-hazardous soils.

Risk assessment offers one way of overcoming the cost of excavating and disposing of contaminated soils. A risk assessment approach develops and uses soil and groundwater criteria that are specific to the site, as opposed to using generic criteria. Risk assessment can also employ land use restrictions and engineering controls to minimize exposure to contaminants.

Several of the projects used risk assessment to significantly reduce the environmental remediation costs. A risk assessment was prepared and approved for the Abe Zakem House development, using the Atlantic Risk-Based Corrective Action (RBCA) process. This risk assessment allowed some of the soils contamination to be left in place on the site but required that a number of risk mitigation measures be implemented such as a thicker concrete building slab, an impermeable vapour barrier and a mechanical ventilation system.

The use of a risk assessment reduced the remediation cost for Le Cours Chaboillez project below the estimated cost for a dig-and-dump approach. The risk assessment requirements included the elimination of underground parking spaces in favour of above ground interior parking spaces so that contaminated soils would not have to be removed from the site.

Alternative remediation technologies and innovative materials recycling practices can help reduce costs also. The developer of Hamilton Beaches used bioremediation instead of the much more expensive dig-and-dump option, and realized considerable cost savings which contributed to the project's economic viability.

The Spencer Creek Village developer demolished a former foundry building to make way for new residential units and commercial space. A system of innovative materials sorting and recycling was implemented to reduce demolition costs. Foundry sand, structural steel, wood and reclaimed bricks were sold for reuse. Waste brick was crushed on site and used for landscaping, and concrete from the building was crushed and reused for road beds on the site. The savings associated with this intensive on-site recycling activity helped make the project economically viable.

The case studies demonstrate that the significant barrier to redeveloping brownfield sites for residential use associated with the cost of environmental remediation can be overcome on some brownfield sites by using a risk-based remediation strategy and innovative construction techniques. Overcoming the remediation cost barrier usually involves the adoption of innovative approaches to site assessment and remediation such as risk assessment, the use of alternative remediation technologies or costs savings achieved through materials recycling. Both small and large residential projects across the country, and even those on heavily contaminated sites, have been able to overcome the remediation cost barrier using the techniques described above.

Financial and General Economic Conditions

In some areas, market demand is strong enough to allow brownfield to housing projects to occur without the use of financial incentives. For example, strong local demand for housing in Richmond, combined with minor site contamination meant that the London Landing development could easily bear the remediation cost.

Many brownfield sites, however, are not and may never be economically viable because of the cost of remediation. These sites that indicate a negative value after remediation, can lie dormant for many years until market conditions change. Nevertheless, a number of jurisdictions have developed financial incentive programs to offset the negative value of the property after remediation.

The Hamilton Beaches project received funding from the City of Hamilton's ERASE program toward the cost of remediation. This contribution and the cost savings associated with the use of bioremediation impacted positively on the development's economic viability. Likewise, the developer of the Spencer Creek Village is eligible for an ERASE Redevelopment Grant towards remediation expenses.

The developer of Wellington Square took advantage of financial incentives offered under the City's Contaminated Sites Grant Program (CSGP)[1]. The environmental remediation costs were recouped in part through a grant given for each residential unit created on the property. Other development grants and incentives available to encourage redevelopment in the City's three core areas were used also, including development application fee and building permit fee waivers and a development charge exemption. The developer was able to use Cambridge's Realty Tax Grant Program which provides grants to property owners on the City's portion of realty tax increases resulting from property improvements. If not for the City's Contaminated Sites Grant Program (CSGP) and other complementary municipal incentives for core areas, the project would not have been economically viable.

The Province of Quebec's Revi-sols program[2] is designed to promote the remediation and redevelopment of brownfield sites in Montréal, Québec City and other municipalities in Quebec. A grant from the Revi-sols program is going towards the remediation cost of the Quai des Éclusiers and Le Cours Chaboillez projects in Montréal. The Quai des Éclusiers development is receiving a demolition grant from the City of Montréal also, to help offset the total remediation cost.

Market timing is an important consideration with respect to residential projects on former brownfield sites as for other residential intensification developments. The Oliver Village project was initially delayed by a weak residential housing market in Edmonton in the early to mid-1990s. But by 1997, the increase in land value attributable to increased market demand more than compensated for the cost of remediation. When the Wellington Square project was built, the market for residential housing in downtown Cambridge was still developing. The developer was unable to sell units at prices required to make the project profitable. However, since Wellington Square was completed, other residential infill projects have taken place in downtown Cambridge and the selling prices of units in these developments have increased. According to Cambridge officials, Wellington Square appears to have initiated an urban renaissance in the city.

Planning and Regulatory Approvals

As experienced by other forms of residential intensification, planning approvals for brownfield redevelopments can be complex or lengthy, creating time delays and increasing development costs. Approval of the rezoning applications for the Brandt's Creek Crossing project required considerable negotiation and collaboration between the developer and the City. The development faced other complexities, in addition to the contamination, necessitating compliance with legislation at all levels of government and agreements for property exchanges and lot line adjustments. Together, these requirements and complexities added to project approval time and cost.

The first rezoning application for the London Landing project took approximately two years for approval. Because a clear plan did not exist for the area, a comprehensive area plan was prepared to determine the developer's vision for the site and to establish servicing requirements. Residents and councilors also wanted the development to conform to the area's character and enhance its amenity appeal. In response, the developer designed a residential community that is sensitive to the area's heritage and rural character. While community concerns translated into longer approval times, the heated residential real estate market in Richmond allowed the developer to wait and marketability was enhanced by the development's heritage sensitive design. Once the City was comfortable with the developer's vision, it provided a high level of support and cooperation, and later phases of the project were approved more quickly.

The Oliver Village, Wellington Square, and Quai des Éclusiers properties were pre-zoned by the municipality to allow residential use, avoiding the need for a rezoning application and potential related delays. For the developer of Quai des Éclusiers, the existing residential zoning contributed to his decision to purchasing the site.

Several municipalities provide a streamlined regulatory process and assistance for brownfield redevelopment projects (the Cities of Cambridge and Hamilton). Assistance offered includes dedicated staff person(s) to guide developers through the regulatory and planning approvals process and assisting the developer in soliciting and evaluating proposals from remediation contractors. Evidence from the case studies suggests that this regulatory streamlining and assistance represents a critical component of a successful municipal brownfield redevelopment program.

[1] The Cambridge Contaminated Sites Grant Program is profiled in CMHC's *Residential Intensification Case Studies: Municipal Initiatives* (Research Highlight 63337).
[2] The Urban Contaminated Sites Program Revi-sols is profiled in CMHC's *Residential Intensification Case Studies: Municipal Initiatives* (Research Highlight 63337).

The Atlantic RBCA Process has generated regulatory efficiencies for municipalities and developers in the Atlantic Provinces. Through Atlantic RBCA, the Atlantic Provinces have harmonized remediation criteria and provide training for regulators, responsible parties and site professionals in the use of the Atlantic RBCA Tool kit. By providing regulators and developers with a standardized and pre-approved methodology for applying risk assessment to all petroleum-impacted sites, the site assessment and remediation process is more efficient for all parties involved. This simplification in the process is partly responsible for the ten-fold increase in the number of sites remediated since the introduction of the Atlantic RBCA Process.

Neighbourhood Opposition

The case studies suggest that neighbourhood concern and opposition (NIMBY) can act as an obstacle to the redevelopment of brownfield sites for residential use. One interesting finding is that with the exception of the Abe Zakem House development (where three adjacent residential properties were contaminated by the former public works yard), public opposition to these brownfield redevelopment projects had nothing to do with the environmental condition of a site. Public opposition focused on traditional planning concerns within an urban redevelopment setting such as density, building heights, setbacks and design, and traffic impacts. In other words, once a brownfield site has been remediated, the barriers to its redevelopment for residential use are similar to those faced by any urban infill or redevelopment project in an established neighbourhood.

As for other residential intensification developments, public opposition can be overcome and support gained for brownfield redevelopments by engaging in early and effective public consultation. The developers of Brandt's Creek Crossing and Le Cours Chaboillez made good use of community consultation through multiple community information sessions and public meetings to gain support for their development plans. Hamilton Beaches was redesigned to effectively address neighbours' concerns regarding the height of the development.

CONCLUSIONS

The case studies suggest that the barriers to the redevelopment of brownfield sites for residential use can be overcome using a number of techniques. These techniques include the use of innovative remediation and soils/materials recycling approaches; alternative remediation technologies; financial incentive programs; standardized assessment methodologies; proactive planning approaches such as pre-zoning properties; and effective public consultation.

The nine brownfield redevelopment projects will create approximately 3,315 new residential units on 31.9 ha (78.6 acres). They have or will generate increased property assessment values and property tax revenues. Many are contributing to revitalization of their neighbourhoods and have brought in new residents for local businesses. Some have created affordable housing for low-income households or provided housing in tight markets. They have generated economic spin-offs, through remediation and construction activity and employment. The case studies provide evidence that brownfields hold great potential to provide a broad range of housing within existing urban areas and make efficient use of land and existing infrastructure. Brownfield redevelopment for housing represents one approach for municipalities to embrace sustainable development and promote Smart Growth.

Table 1: **Summary of Case Studies - Built Projects**

Project name/ developer	Municipality	Previous site use, condition and remediation	Project description	Completed	Challenges	Lessons learned, success factors
London Landing London Landing Development Corporation	Richmond, B.C.	• Mixed industrial uses • Minor contamination in the form of sand blasting waste, heavy metals and oil contaminants • Site remediated via aeration("land farming") • Remediation costs of $35,000	• 6-phase, 221– unit residential development of detached town homes, stacked residential units and condominium apartments • 930 m^2 of commercial space	• Expected completion in late 2006	• Initial planning approval delays (two years for first rezoning application) • Designing a heritage sensitive development • Requirement to assemble parcels of land over time in phases • Each phase required separate rezoning and other planning approvals	• Efficiencies in the planning regulatory process can be achieved by assembling all parcels at one time. • Had the developer been able to assemble all land at one time, a Comprehensive Area Plan could have been completed at the beginning of the process and only one rezoning application approval required. • The developer's efforts to respect the heritage of Richmond contributed to a cooperative and efficient relationship with the City. This has reduced planning approval timelines for latter project phases.
Brandt's Creek Crossing Canada Lands Company/ Cascadia Pacific	Kelowna, B.C.	• Former CN Rail Yard • Significant hydrocarbon and heavy metal contamination • Site remediated via dig and dump, with remediation costs of approximately $1.5 million	• An 8.4 ha mixed- use neighbourhood with industrial, office, commercial and residential lots and a hotel site • 600 residential units • Cascadia Pacific currently developing the first residential phase (89 high-rise condominium units: the Icon development)	• All residential units expected to be completed by 2010	• High degree of contamination • Complex approval process involving three levels of government	• More extensive testing for heavy metals on former rail sites could allow for better decisions about redevelopment potential and associated costs. • A clear municipal vision for the site, including pre-zoning made the planning approvals process more efficient. • CLCs ownership of the entire site meant clear responsibility for remediation and no need for parcel assembly. • Early community engagement allowed CLC to approach City Council with public support. • CLCs resources and preparedness was a major success factor for a site of this size and level of contamination.

Table 1: **Summary of Case Studies - Built Projects (con't)**

Project name / developer	Municipality	Previous site use, condition and remediation	Project description	Completed	Challenges	Lessons learned, success factors
Oliver Village Canada Lands Company (CLC)/ Westcorp Inc.	Edmonton, Alta.	• Former CN Rail Yard in downtown Edmonton • Minor hydrocarbon contamination • Site remediated via aeration and dig and dump • Remediation costs of $252,000	• 308 rental apartment units in two towers • 3,800 m^2 of commercial space	• Project completed in 2003	• Primary challenge was weak market demand in the early to mid-1990s • Designing a community which would integrate communities to the north with the downtown area	• The City had a clear vision for the site and had put the appropriate zoning in place, making for an efficient redevelopment process. • The City negotiated a remediation agreement with CLC providing the certainty needed to approve the development.
Wellington Square First Suburban Homes/ Lancer Group	Cambridge, Ont.	• A variety of industrial uses in the past including a foundry and a brewery • Lead, zinc, hydrocarbon and polycyclic aromatic hydrocarbon (PAH) contamination • Contamination related to the use of foundry sand and slag as fill on the site • Site remediated using dig and dump at a cost of $1 million	• 82 town homes on a two- hectare portion of the site • A 138–condominium development to be built on the remaining 0.7 hectares (the Lancer Group)	• Townhouses completed in 2004	• High degree of contamination and associated remediation costs • Soft market demand at the time of completion of townhouse units	• The City's Contaminated Sites Grant Program (CGSP) was essential in providing financial incentives for the project; without these the project would not have been economic. • The City's dual zoning in core areas which permits high-density residential and commercial uses meant that a rezoning application was not required. • Complimentary City programs geared to promoting redevelopment in the core areas were also helpful. • The location in downtown Cambridge with easy access to urban amenities was also an advantage.
Spencer Creek Village Urban Horse Developments	Dundas (Hamilton) Ont.	• Former steel foundry that produced military armaments; subsequent use for manufacturing mining equipment and former PCB storage site • Contamination in the form of foundry sand used as fill across the site and other contaminants including creosote- impregnated wooden floor blocks • Site remediated using dig and dump, on-site sorting and re-use of acceptable soils as fill, and some bioremediation of hydrocarbon contaminants • Site remediation costs estimated at $2,000,000	• 11-phase, 598–residential unit development in nine buildings including condominium apartment units and rental apartments for seniors • 1,300 m^2 of commercial space	• Two residential buildings completed and a third under construction • Expected completion date of all buildings is 2010	• Remediation and demolition costs • Phasing of environmental and planning approvals • Stigma associated with the site	• Time required to negotiate agreements with municipality was longer than expected. • Important to establish a level of trust between developer and municipal staff early in process. • Solid project financing must be in place from the beginning because brownfield projects generally take longer. • A large scale brownfield project without a municipal incentive program and solid municipal support is difficult. • Developer must be involved in every aspect of project to control costs. • Extensive recycling of on-site materials, and sorting and reuse of acceptable soils on-site provided substantial cost savings.

Table 1: **Summary of Case Studies - Built Projects (con't)**

Project name / developer	Municipality	Previous site use, condition and remediation	Project description	Completed	Challenges	Lessons learned, success factors
The Hamilton Beaches Midevco Group of Companies	Hamilton, Ont.	• Former gasoline/service station • Petroleum contamination in soils and groundwater on site and on two neighbouring properties • Remediation completed via bioremediation costing $450,000	• 93 residential units including: – 18 freehold townhouses – 21 stacked condominium townhouses – 54 condominium apartments in three 3-storey buildings	• Construction commencing in January 2005, with project completion expected in December 2006	• Cost of remediation using traditional dig and dump • Neighbourhood opposition to original planned four-storey condominium buildings	• Community opposition to development addressed through project redesign. • Time required to obtain planning approvals can exceed even conservative estimates and should be built into project planning and financing timelines. • Bioremediation technology addressed off-site impacts and reduced remediation cost. • Cost-sharing arrangement with municipality and availability of municipal tax-increment financing remediation grant helped make project financially viable. • Technical assistance and coordination provided by the municipality's brownfield coordinator meant the developer dealt with fewer individuals and municipal departments.
Le Cours Chaboillez True North Properties Ltd.	Montréal, Que.	• Site used for numerous industrial activities • Property covered by fill material and debris with significant volume of contaminated soils and groundwater • Remediation costs pegged at $8,200,000 using risk assessment approach • $2,600,000 remediation grant from Province of Quebec's Revi-sols Program	• 990 high-density residential units in nine buildings, plus retail commercial uses • Condominium apartment units and townhouse units	• Construction started in March 2003 on three buildings in the South Phase • Construction has commenced on two buildings in the North Phase • Expected completion of last building in March 2007	• Cost of removal and off-site disposal • Several rezonings required to modify original concept	• Risk assessment approach made project financially viable. • Risk assessment approach required approval from Quebec Ministry of Environment which increased time required for environmental approvals. • Project included innovative planning and urban design features.

Table 1: **Summary of Case Studies - Built Projects (con't)**

Project name / developer	Municipality	Previous site use, condition and remediation	Project description	Completed	Challenges	Lessons learned, success factors
Quai des Éclusiers Développements des Éclusiers inc.	Montreal, Que.	• Wrought iron factory with galvanization of iron and fabrication of steel pipes • Site covered by fill material, debris and waste • Phased remediation using dig and dump • Total remediation cost estimated at $6,500,000 • $860,000 remediation grant from Province of Quebec's Revi-sols Program • $800,000 grant from City of Montreal	• 400 residential units in four six-storey condominium buildings on the Lachine Canal	• Expected completion by December 2006	• Public hearings regarding proposed demolition of foundry complex • Pressure to incorporate social housing on site • Developer worked with the groups to demonstrate that the land costs and remediation costs precluded economically feasible social housing	• Financial support from Revi-Sols Program and City of Montreal contributed to success of this project. • Proper long-term planning of all project components key to a project of this type. • Project incorporates unique design features that reflect and celebrate the Lachine Canal's industrial past. • Integration of efforts from public and private sector and the community resulted in a project that blends in well with the existing urban landscape.
Abe Zakem House Kiwanis Club of Charlottetown.	Charlottetown, P.E.I.	• Former City of Charlottetown public works garage • Petroleum hydrocarbon contamination in soil and ground water, with three neighbouring properties also impacted • Atlantic Risk- Based Corrective Action (RBCA) process used to assess site • Site redeveloped subject to land use restrictions and engineering and building design controls	• City of Charlottetown donated property to the Kiwanis Club to redevelop for affordable rental apartment units • 23 apartments units, of which all but one are rented at below-market rates	• December 2004	• Obtaining financing and mortgage insurance because the Kiwanis Club had little construction experience and few physical assets • Public concerns about environmental impacts of contamination, potential loss of waterfront views and traffic	• A clear understanding of the level and extent of contamination and the means of mitigation allowed developer to take a proactive approach. • The Atlantic RBCA process allowed safe and cost-effective redevelopment of the site while leaving some contaminants in place. • Involve neighbouring property owners in the planning process as early as possible. • Financing accomplished through the effort, creativity and cooperation of the municipality, CMHC and the bank.

Table 2: **Summary of Case Studies - Brownfield Initiatives**

Project name / Program name	Location	Impetus	Program description and goals	Program cost	Program response	Program evaluation
Hamilton Environmental Remediation and Site Enhancement (ERASE) Community Improvement Plan (CIP)	Hamilton, Ont.	• Hamilton's long industrial history and placement of vast quantities of contaminated fill created hundreds of brownfields in city's old industrial area • ERASE CIP prepared in context of the City's sustainable community plan (Vision 2020) • ERASE CIP adopted by City of Hamilton and approved by Province of Ontario in 2001	• Main goal of ERASE CIP is to improve economic opportunities and environmental conditions in the older industrial area of Hamilton • ERASE Plan offers three financial incentive programs: –ERASE Redevelopment Grants–tax-increment financing based grants to help pay for environmental remediation costs, demolition and site preparation –ERASE Environmental Study Grants which pay for up to half of the costs of environmental studies –ERASE Planning and Development Fee Rebates	• To end of 2003, $2,500,000 in ERASE Redevelopment Grant Funding committed	• To end of 2003, Environmental Study Grant Program had provided $43,000 in grant funding for six environmental studies • To end of 2003, five projects approved for an ERASE Redevelopment Grant, and a sixth project (The Hamilton Beaches) provided with a pilot project grant for environmental remediation • 93 new residential units to be completed by December 2006	• Results of programs have been monitored since 2001. • Monitoring resulted in discontinuation of Planning and Development Fee Rebates in 2004. • ERASE CIP has been used as model by other Ontario municipalities to prepare brownfield redevelopment community improvement plans. • ERASE CIP is being expanded to include all of Hamilton's urban area.
Atlantic Risk-Based Corrective Action (RBCA) Process	Atlantic Provinces	• With many petroleum-impacted sites and a reliance on ground water resources, the Atlantic Provinces had to come to terms with the challenges associated with remediating these sites. • 80 to 90 per cent of these sites were on the scale of corner gasoline stations, and could not bear the cost of remediation to generic criteria or the costs associated with conducting a site- specific risk assessment (SSRA) from first principles for each property. • As a result, these sites remained contaminated, abandoned and unproductive.	• Atlantic RBCA process put in place in 1999 • Atlantic RBCA is a set of scientifically derived risk-based criteria and a "pre-approved", cost-effective methodology for applying SSRA to sites which require it • Atlantic RBCA has made it cost effective for owners of small contaminated sites to remediate these sites	• The Atlantic Partners in RBCA Implementation (PIRI) Committee operates on a yearly budget of $70,000 to $100,000, contributed by industry and government members • PIRI committee members donate "in-kind" services to Atlantic RBCA	• Number of impacted sites reaching closure has increased ten-fold since the implementation of Atlantic RBCA • Conservative estimates are that more than 3,000 sites have been closed	• Atlantic RBCA process is successful because it is simple to use, and is consistently applied. • Atlantic RBCA harmonizes standards and brings to all sites the potential benefits of an SSRA at a fraction of the cost of a full SSRA from first principles.

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